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SITE SAFETY AND HEALTH PLAN

For:
Off-Site Containment Area Interim Cover

At:
American Chemical Services, Inc.
National Priority List Site
Griffith, Indiana

Prepared For:
Montgomery Watson Constructors, Inc.
27755 Diehl Road – Suite 300
Warrenville, IL 60555

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OFF-SITE CONTAINMENT AREA INTERIM COVER

at

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National Priority List Site
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Prepared for:
Montgomery Watson Constructors, Inc.
27755 Diehl Road
Suite 300
Warrenville, IL 60555

Prepared by:

Koester Environmental Services, Inc.
14649 Highway 41 North
Evansville, Indiana 47711

July 2001
KES Project #53118

APPROVAL PAGE FOR THE AMERICAN CHEMICAL SERVICE HEALTH AND SAFETY PLAN, OFCA INTERIM COVER

We have reviewed and approved this plan.

Erin K. Blankenberger, CIH
Koester Health and Safety Manager

Date

Jeff Wickham
KES Project Manager

Date

EMERGENCY PHONE NUMBERS

ORGANIZATION	CONTACT	TELEPHONE
Ambulance		**911**
Police		**911**
Fire		**911**
		(219) 924-3151
Community Hospital - Munster		(219) 836-1600
St. Mary's Occupational Health	Len Schmidt	(219) 947-6495
IDEM	Main Office	(317) 232-8603
	Emergency Response	1-888-233-7745
EPA Region 5	Main Office	(312) 353-2000
Poison Control Center		1-800-282-5846
National Response Center		1-800-424-4100
Center for Disease Control		(404) 488-4100
CHEMTREC		1-800-424-9555
KES Project Manager	Jeff Wickham	(812) 868-6205 office
		(812) 455-8950 cellular
KES Site Supervisor	Jim Hawkins	(812) 480-1128 cellular
Montgomery Watson Contact	Todd Lewis	(630) 836-8924

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) establishes guidelines and requirements for the health and safety of all personnel engaged in the Off-site Containment Area Interim Cover project at the American Chemical Service National Priority List Site in Griffith, Indiana. The procedures and guidelines contained herein are based upon the best available information at the time of the plan's preparation. Any specific requirements not addressed in this site-specific plan will follow the Koester Health and Safety Program. Specific requirements will be revised in the event new information is received or conditions change.

This plan applies to employees of Koester Environmental Services, Inc. (KES) and any subcontractor or site visitor involved in projects associated with this contract. All personnel entering the work site will read, sign, and abide by all provisions of this HASP.

1.1 OBJECTIVE

The objective of this project is to place an interim cover over the Off-Site Containment Area (OFCA). The objective of the interim cover is to effectively isolate the OFCA and prevent further migration of contaminants into and out of the contained area. The following tasks are associated with this project:

- Surveying and Site Preparation
- Re-grading of existing clay cover
- Grading drainage swales
- Installing clay layer
- Installation of erosion control
- Final cap revegetation
- Demobilization

This project is expected to begin in late July 2001 and be substantially completed by the end of August 2001.

1.2 SITE DESCRIPTION

The American Chemical Service NPL Site (ACS) is an operating chemical processing facility. The site began operations in 1955 with reclamation of spent solvent waste. The site accepted solvent mixtures containing alcohols, ketones, esters, chlorinated hydrocarbons, aromatics, aliphatics, and glycols that contained various residues. Other processes that have operated at the site since 1955 include specialty chemical manufacturing in small batches, burning of still bottoms and non-reclaimable materials in incinerators, epoxidation and bromination operations, and storage and blending of waste streams for ACS's secondary fuel program.

The Off-Site Area is located south of the ACS facility railroad tracks and encompasses the Off-Site Containment Area and the Kapica-Pazmey building area. A large portion of the Off-Site Area is essentially a continuation of the Town of Griffith landfill.

In 1997, a continuous barrier wall was installed around the On-Site Containment Area, the ACS operating facility, the Off-Site Containment Area and the Kapica-Pazmey Area. The barrier wall encloses the known source areas at the Site. A groundwater extraction system inside the barrier wall, comprised of eight 100-foot long extraction trenches, was installed to maintain a hydraulic capture zone within the barrier wall, and is referred to as the BWES. Groundwater from the BWES is treated in the groundwater treatment system.

A 12" thick layer of clay was installed over the existing grade of the Off-Site Containment Area. This was installed in an attempt to further contain the contaminated areas, so as not to allow further migration of the source of contamination into non-affected areas. In the first half of 2001, spoils stockpiled in the OFCA were re-graded and additional clay material was placed.

1.3 SAFETY PHILOSOPHY

There is no work on this project that cannot be done safely. You should expect the unexpected. Report all safety issues to your supervisor immediately. Use your common sense. Chances are if you think it is a problem, it will be a safety issue. All employees, subcontractors, and visitors are expected to abide by and adhere to the safety rules outlined in this plan. If they cannot follow these rules, then they will not be allowed onto the site.

Safety is everyone's responsibility on this jobsite. If you see a problem you should: fix it, report it, but do not ignore it.

1.4 WORK PRACTICES AND PROCEDURES

Task-specific safety and health practices and procedures will be followed during this project in conformance with the ACS Safety and Health Plan for Non-ACS Personnel, NFPA, ANSI, and OSHA. Additionally, the Koester Health and Safety Program Manual will be followed. In the event there is a conflict between the provisions of the aforementioned practices and procedures, the more stringent provision will prevail.

2.0 STAFF ORGANIZATION

2.1 ON-SITE PERSONNEL

The ***Site Supervisor*** will have the responsibility of implementing this HASP. He reports directly to the Project Manager and will work directly with the client and subcontractors on health and safety matters. He will conduct daily inspections to determine if operations are being conducted in accordance with the HASP and OSHA regulations. The Site Supervisor reports to the Health and Safety Manager with health and safety issues. His responsibilities include, but are not limited, to the following:

- Provide leadership and support for the health and safety program.
- Monitor the lost time incidence rate for this project and work towards improving it.
- Monitor regulatory compliance and work towards zero citations and violations.
- Encourage on-site personnel to make safety their number one priority.
- Inspect, daily, each work area for regulatory violations and possible hazards.
- Train and educate workers in methods and techniques that are free from hazards.
- Ensure that the workers understand the properties and hazards of materials to be used.
- Conduct daily safety meetings with all personnel.
- Ensure that workers have and use the proper tools and equipment.
- Ensure that housekeeping in all areas is up to the desired level.
- Ensure all accidents/injuries/illnesses are investigated.
- Suspend field activities if the health and safety of on-site personnel are endangered.

Equipment Operators will have the responsibility of operating the heavy equipment in a safe and professional manner. Employee responsibilities include, but are not limited to:

- Reporting all injuries, illnesses, accidents, or near misses immediately.
- Complying with the provisions of this HASP.

The ***Field Technicians*** have the responsibilities of performing the labor work associated with this contract in a safe manner. Employee responsibilities include, but are not limited to:

- Reporting all injuries, illnesses, accidents, or near misses immediately.
- Complying with the provisions of this HASP.

2.2 CORPORATE STAFF PERSONNEL

Project Manager. The Project Manager is responsible for project health and safety issues that include, but are not limited to:

- Ensuring that the project is performed in a manner consistent with this HASP.
- Ensuring that this plan, where required, is approved and properly implemented.
- Providing the Health and Safety Manager with sufficient information, reasonably in advance of projects, to allow a proper evaluation of the operational or procedural hazards.
- Ensuring that the medical surveillance requirements within the HASP are enforced.
- Investigating and reporting accidents/incidents, and determine if modifications in work practices are required due to an accidental exposure or injury.
- Ensuring personnel are properly trained and informed about assigned tasks.

The ***Health and Safety Manager*** will promote the maintenance of a safe, accident free, and healthy work environment; assist in the development and implementation of the safety programs to prevent or correct unsafe environmental working conditions; inspect machinery, equipment and working conditions on construction sites, or other settings, to ensure compliance with appropriate rules and regulations set forth by OSHA and other rules and regulations. The Health and Safety Manager will be on-site at the beginning of the project and visit the site as needed.

3.0 TRAINING AND HAZARD COMMUNICATIONS

3.1 GENERAL SITE WORKERS

Only trained and qualified individuals will be permitted to work on this project. Although not required for all aspects of this project, certain KES personnel will have completed the 40-hr HAZWOPER training as specified in 29 CFR 1910.120(e). An 8-hr annual refresher-training course has also been provided to these personnel. Certificates for site personnel with HAZWOPER training will be made available as necessary.

Site personnel are experienced in the work that will be performed on this project. KES personnel have been trained in the following areas:

- Hazard recognition
- Principles of toxicology, biology and chemistry
- Safe work practices
- Decontamination methods
- Emergency procedures and medical surveillance
- Engineering controls
- Site safety plans
- Proper and safe use of field air monitoring equipment
- Handling , storage, and transportation of hazardous waste
- Personal protective equipment and respiratory equipment use and selection
- Site Control

Prior to the start of work, the Site Supervisor will have all personnel review the Health and Safety Plan and the Activity Hazard Analysis forms developed for this project. This information will be provided to all employees and recorded on the Daily Safety Report.

3.2 VISITOR TRAINING

Should an occasion arise when an official visitor seeks entry to a work area, the visitor will be required to attend a short safety orientation covering relevant information outlined above that will be given by the Site Supervisor. The visitor will not be allowed in the Work Zone without the proper protective equipment required for the area. The visitor will sign the H&S Plan Acknowledgement form certifying that he or she has read and understands the site safety plan and meets the requirements for entry to the worksite.

3.3 PRE/POST HEALTH AND SAFETY BRIEFINGS AND PROGRAMS

The Site Supervisor, or his designee, will conduct the following health and safety briefings and programs and document:

- Daily Tailgate meetings
- Weekly site checklists
- Reviewing Site Specific Plans with crew before each site job begins
- Post accident Reviews (as needed)
- Other issues as deemed necessary by the Project Manager or Health and Safety Manager

The Site Supervisor will conduct daily checks of the worksites to verify compliance with this program. These checklists will be filled out and submitted to the Health and Safety in a timely fashion. The Site Supervisor will also be responsible for maintaining the site OSHA 200 Log.

Short tailgate meetings will be held daily. The Site Supervisor will document and sign safety-meeting forms and submit them to the Health and Safety Manager.

The Health and Safety Manager will conduct safety audits of the site on an as-needed basis. The H&S Manager will conduct in-house:

- Review of Site photos
- Weekly in-house review of paperwork
- Review of all accidents and incidents
- Maintain an OSHA 200 Log for Corporate Records
- Periodic interaction (verbal/written) with Site Supervisor

The Health and Safety Manager will conduct a pre-site work safety meeting. This meeting will update the training modules of all site employees and include, but not be limited to:

- Safety Expectations
- Site Safety Plan Review
- Excavation/Heavy Equipment

4.0 MEDICAL SURVEILLANCE

4.1 MEDICAL SURVEILLANCE PROGRAM

This project does not require medical surveillance for non-40-hr HAZWOPER (29 CFR 1910.120) trained personnel. For those personnel who are trained according to 29 CFR 1910.120, physical examinations are provided. All subcontractors are expected to meet these requirements as per 29 CFR 1910.120(f) at their own expense if the requirement is applicable. The examinations address the chemical and physical hazards to which employees will be exposed. Section 10 of the Koester Health and Safety Program Manual describes the areas covered for physical examinations. KES will have medical certifications for each KES employee available upon request from our Medical Review Officer (MRO).

4.2 EMERGENCY/NON-EMERGENCY TREATMENT

Emergency treatment will be obtained from Community Hospital in Munster, Indiana. A map, with directions, to the hospital is located in Appendix A. Non-emergency treatment will be obtained from St. Mary's Occupational Health, 1500 S. Lake Park Avenue, Hobart, Indiana, (219) 947-6495.

Emergency manuals will be kept in the trucks that will include phone lists, emergency phone numbers, and maps to the hospital.

4.3 RECORDKEEPING

Medical records are maintained by the Koester Companies, Inc. (parent company) Corporate Safety Department and will be stored in a locked, fireproof file cabinet. Disclosure of an individual's records will only be made to that individual and the Corporate Safety Department.

4.4 PROGRAM REVIEW

The physician at our Evansville, IN Occupational Medicine Clinic will serve as the Occupational Physician for this project.

Dr. Ray Christopher is the Occupational Medical Physician for KES. Dr. Christopher is a board certified Occupational Physician working for St. Mary's Medical Group. Dr. Christopher has 11 years experience as Director, Occupational Health, with the U.S. Navy. He has served as hospital director of Clinical Services with experience in Risk Management, Utilization Review, and Infection Control. Dr. Christopher also has over 4000 hours of emergency room coverage.

The medical exams will be conducted as: Baseline/Entry, Exit Exams, and Periodic Exams. Post Exposure exams will be conducted when necessary. KES will have medical certifications for each employee available upon request from our Medical Review Officer (MRO). Proof of compliance by subcontractors to the Medical Surveillance Program is to be made available to the KES Health and Safety Manager.

5.0 HAZARD EVALUATION

Activity Hazard Analysis forms have been completed for this project and are located in Appendix B. Tasks associated with this project include:

- Mobilization/Site Prep
- Clearing/Grubbing
- Excavation (Grading & Installation of Clay Layer)
- Installation of Erosion Control
- Transportation of Soil

The Site Supervisor will discuss these analyses prior to performing these tasks. If a task is to be performed that is not listed above, the Site Supervisor will complete an Activity Hazard Analysis prior to performing the task.

5.1 GENERAL HAZARDS

During the course of this project, employees may be exposed to a variety of occupational hazards. The hazards that are anticipated for this project include, but are not limited to, the following:

- Chemical Exposures – Metals, organics.
- Physical Exposures
  - Slips/Trips/Falls
  - Equipment Operation Hazards
- Noise
- Heat Stress

These hazards are discussed in Section 5.2 and Section 6.0.

5.2 CHEMICAL HAZARDS

This project does not include intrusive activities that would potentially expose employees to hazardous materials. Therefore, the overall chemical hazard potential during performance of work under this plan is low. Inhalation, ingestion and skin contact are potential routes of exposure during site activities. Personal protective equipment to be worn during this project is described in Section 8 of this plan.

If, during the course of work, the cap is penetrated, then the potential for chemical exposure increases. The material below the cap may be contaminated with metals and organics. A list of the potential contaminants is listed in Appendix C.

5.3 HAZARD COMMUNICATION

The objective of this section is to provide all necessary chemical information on hazardous substances to be encountered on this project. This will be accomplished by providing Material Safety Data Sheets (MSDS) and describing procedures for labeling of containers and personnel training.

KES will rely on the chemical manufacturer to provide all necessary information concerning the chemical. In the event a MSDS is not available, we will utilize existing reference books and databases to make decisions concerning the hazards present. This process will be done with the Corporate Certified Industrial Hygienist and/or the Health and Safety Manager.

Material Safety Data Sheets will be available on-site for each hazardous substance utilized on the worksite by KES and all subcontractors. Subcontractors are responsible for providing their own MSDSs. When a new hazardous material is brought on-site, the MSDS will be reviewed during a daily safety meeting.

Containers of materials that are a health, flammability, or reactivity hazard may be labeled using the National Fire Rating System (NFR). This system is used as the means of communicating the hazards of a particular chemical. The rating system reflects:

- **Health - Blue:** Indicates that the material may directly, or indirectly, cause permanent or temporary injury due to acute exposure by physical contact, inhalation or ingestion.
- **Flammability - Red:** Assesses the relative susceptibility of materials to fireburst, based on the form or condition of the material and its surrounding environment.
- **Reactivity - Yellow:** Advises that the material may be susceptible to explosion, whether through self-reaction or polymerization, or by exposure to certain conditions or substances.
- **Specific Hazard - White:** Covers special properties and other hazards associated with a particular material. Especially useful for emergency response or fire-fighting teams.

Numbers appearing in the three colored blocks range from 4 being the most hazardous, decreasing in hazard to no number appearing in the blocks.

Labels must show the name and address of the manufacturer. If the label is removed or defaced, the container must be marked to reflect its contents.

All KES employees are trained on the Hazard Communication Program as part of the annual Hazardous Materials Waste Site Worker (HAZWOPER) refresher training and are familiar with all aspects of this section. Subcontractors are responsible for insuring their employees are trained as required by the project. Proof of training is to be provided to the KES Health and Safety Manager.

6.0 STANDARD OPERATING PROCEDURES

6.1 HEAVY EQUIPMENT

KES will utilize dozers, rollers, compactors, and tractors on this project. Heavy equipment can represent a substantial hazard to workers. Specific requirements of heavy equipment operation include:

- Blades, buckets, dump bodies, and other hydraulic systems must be fully lowered when equipment is not in use.
- Parking brakes will be engaged when equipment is not in use.
- Seat belts must be provided and worn.
- Equipment with an obstructed rear view must have an audible alarm that sounds when it is operating in the reverse direction (unless a spotter guides the vehicle operator).
- The operator, prior to the beginning of each work shift, will inspect heavy equipment and the Site Supervisor will ensure the compliance with this requirement.
- Only qualified personnel are to operate heavy equipment.
- Never walk directly in back of or to the side of, heavy equipment without the operator's knowledge.
- Be sure that no underground or overhead power lines, sewer lines, gas lines, or telephone lines will present a hazard in the work area.
- All equipment shall utilize rollover protection.
- Never stand and place equipment within the swing radius of equipment.

6.2 SLIPPING/TRIPPING/FALLING

Like any construction site, there is a potential for slips, trips, and falls.

- All site personnel will wear steel-toed boots.
- The construction site will be maintained in an orderly fashion at all times and materials put away at the end of the workday.
- Stay away from excavations without fall protection.
- Insure all excavations and open holes have been secured and marked with barriers.
- Any excavation, in which someone enters, must have an escape route every 25 feet.
- Do not walk on spoil piles from excavations
- Watch for loose debris around excavations and spoil piles.

6.3 UTILITIES

Montgomery Watson will locate all utilities for KES within the work area prior to beginning work. If a utility is encountered which is not shown on the drawings or otherwise made known prior to the beginning of work, KES will take the necessary steps to assure the utility is not damaged. KES will not be responsible for any damage to underground structures and utility lines not identified on the drawings or not identified and marked in the field. If any underground utility is damaged, KES will notify the Montgomery Watson representative immediately.

Clearances to adjacent overhead transmission and distribution electrical lines will be verified by the Site Supervisor for the movement of vehicles and operation of construction equipment. The requirements stated in 29 CFR 1926 and the National Electric Safety Code will be followed.

6.4 HEAT STRESS

KES has provided all project personnel with the necessary training and monitoring designed to prevent personnel injury due to heat stress. This training was conducted during the HAZWOPER training course (OSHA 1910.120).

Heat stress monitoring will be in effect as needed while workers are wearing chemical protective clothing. In addition, all field personnel will be provided rest breaks on an as needed basis depending on weather conditions. The break areas will be situated so that personnel may remove any chemical protective clothing required, rest in a protected area, and drink cool fluids. For these purposes KES will supply a specially designated break trailer with air conditioning.

Monitoring of personnel wearing chemical protective clothing should commence when the ambient temperature is 70°F or above. The frequency of monitoring should increase as temperatures increase, and employees should be monitored after each work shift when the temperature exceeds 85°F. Personnel shall use the following monitoring program when the ambient temperature exceeds 70°F:

Heart Rate (HR) shall be measured by counting the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 100 beats per minute. Employees shall remain on break until the HR is below 100. If the HR is higher than 100 at the beginning of the rest period, the next work period should be shortened by 10 minutes.

Employees working in chemical protective clothing are trained to recognize signs and symptoms of heat and cold stress. Employees who recognize these symptoms or do not feel capable of performing additional work are to remove themselves from the job, report their condition to the Supervisor, and take appropriate action to correct the problem. Any employee who experiences problems meeting this standard should consult with the Safety Department and their personal physician.

If the body's physiological progresses fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur ranging from mild (such as fatigue, irritability, anxiety and decreased concentration, dexterity or movement) to fatal.

Heat related problems are:

- Heat Rash: Caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat as well as being a nuisance. For minor heat rash, over-the-counter medications generally are sufficient. Bleeding or infected rashes may require medical attention.

- Heat Cramps: Caused by profuse perspiration with inadequate fluid intake and chemical replacement. Signs: Muscle spasms and pain in the extremities and abdomen. Gatorade or generic substitute is a good preventative and helps cure minor problems. Major cramps, especially abdominal, may need medical attention.

- Heat Exhaustion: Caused by increased stress of various organs to meet increased demands to cool the body. Signs: Shallow breathing, pale, cool moist skin, profuse sweating, dizziness, and lassitude. Give the worker rest and plenty of fluids.
- Heat Stroke: The most severe form of heat stress. The body must be cooled immediately to prevent severe injury and/or death. Signs and symptoms are: Red, hot, dry skin; no

perspiration; nausea; dizziness and confusion; strong, rapid pulse, coma. Seek emergency medical attention immediately.

6.5 FIRE PREVENTION AND PROTECTION

Report all fires as soon as discovered. **Dial 911** to report fires. Give his/her name and location of what is on fire. Also give any other information that may be requested by the Fire Department dispatcher. Stay on the telephone until the dispatcher has obtained all necessary information.

20-pound ABC-rated fire extinguishers will be maintained on-site to deal with any minor fires that may occur. Fire extinguishers will be located on mobile heavy equipment and in KES vehicles. Fire extinguishers will also be located near drum sampling activities.

All flammable and combustible liquids will be stored in suitable metal containers and stored properly. Gasoline or any other low flash point flammable liquid will not be used for cleaning purposes or to start fires. Static bonding wires will be properly attached before combustible or flammable liquid is transferred from one vessel to another. Smoking is prohibited where flammable liquids are used or stored.

6.6 COMMUNICATIONS

Cellular telephones will be used to communicate with vendors, sub-contractors, field personnel, and KES support staff. In addition, the crews may utilize intrinsically safe hand-held radios and hand signals to communicate. Correspondence between the on-site crew, Project Manager, and Health and Safety Manager will occur both in writing and verbally over the telephone.

6.7 ACCIDENT INVESTIGATION REPORTS

Responsibilities:

Employees and Subcontractors -

- Report all injuries or occupational related illnesses as soon as possible to your immediate supervisor and the SSHO in accordance with the KES Accident Investigation Policy.

Site Safety and Health Officer -

- Seek appropriate medical care. Report all injuries to the Safety Director **and** the Project Manager within 24 hours.
- In the event of a project-related accident or OSHA reportable injury, KES will notify Montgomery Watson immediately in person or by telephone. A detailed written account will be forwarded to Montgomery Watson within 3 days of the accident/injury.
- **OSHA Reportable accidents require a post accident Drug/Alcohol screening test.**

An accident with any of the consequences listed below shall be immediately reported to the Safety Director **and** the Project Manager. These accidents will be investigated in depth to identify all causes and to recommend hazard control measures. OSHA must be notified when there is:

- **Fatal injury**
- **Serious injury**
- **Three or more persons admitted to the hospital, or**
- **Property damage as specified in the Koester Companies, Inc. (parent company) Corporate Drug/Alcohol Policies.**

Except for rescue and emergency measures, the accident scene shall not be disturbed until the investigating official has released it.

A daily record of all first aid treatments (first aid is defined as any medical care rendered on site by the workers, but does not require the care of a physician, nurse or other health care professional) not otherwise reportable shall be maintained on the proper form, the Daily Safety Report.

In addition KES shall maintain records of all chemical exposure and accident experience incidental to the work on the Accident/Injury/Illness Form. This form will be completed for KES employees and subcontractors as well. KES will maintain records of employee exposure to toxic materials and harmful physical agents and maintain access to the project's Worker Compensation Claims Report which details the compensatable accidents experienced on the project.

6.8 BUDDY SYSTEM

All employees who are engaged in the removal of the drums will at all times use the "Buddy System". The "Buddy System" means a system of organizing employees into work groups in such a manner that each employee of the work group is designated to be observed by at least one other employee in the work group. The purpose of the buddy systems is to provide rapid assistance to employees in the event of an emergency.

Employees using the Buddy System should maintain eye contact and voice communications. Each "Buddy" should check the other employee's PPE for tears and any degradation of PPE that is visible. Employees must immediately leave the decontaminated zones and go through decon to remove and replace the PPE. Conditions to monitor for while performing as a buddy, include:

- Trouble breathing
- Trouble speaking
- Sleepy or weak
- Loss of Coordination
- Damaged PPE i.e. torn outer suits, gloves boots etc.
- Reactions to Heat stress or Cold Stress

If any of these conditions exist, the employee and his buddy are to immediately exit that work zone and seek assistance and emergency assistance.

6.9 HOUSEKEEPING

KES will maintain all areas covered by the project, and those areas affected by project work, free from accumulations of waste, debris, rubbish, and extraneous materials caused by or resulting from construction operation. KES will inspect the site daily. Roadways accessing the project site will be kept free from build-up of dust, soil, mud, waste, or debris, which might result from construction operation.

7.0 SITE CONTROL

7.1 WORK ZONES

Personnel not directly involved with this project will not be permitted to enter the work area. The work area will include the area of excavation. The work zones will be discussed with personnel in the daily tailgate safety meeting.

Exclusion zones and contamination reduction zones will not be identified for this project unless intrusive activities begin. In the event these zones are needed, the Site Supervisor will designate the zones with marking tape, or other appropriate equipment, and discuss the zones with all personnel.

7.2 SITE SECURITY

Site security is necessary to prevent the exposure of unauthorized, unprotected people to site hazards, avoid the increased hazards from vandals or persons seeking to abandon other wastes on the site, prevent theft, and avoid interference with safe working procedures.

To maintain site security during working hours, KES will assign responsibility for enforcing authority for entry and exit requirements to their work areas. This will normally be the Site Supervisor. All visitors to the site will have a valid purpose for entering the site. Trained site personnel will accompany visitors at all times and provide them with the appropriate protective equipment.

7.3 SANITATION, EATING, DRINKING, SMOKING

No eating, drinking, smoking, chewing of tobacco or gum or other hand-to-mouth activities will be permitted in any of the hazardous material work areas during the course of this project. Sanitary facilities, including potable water, toilets, and washing facilities, will be available. KES will ensure that all on-site personnel have ready access to soap and clean water for washing. Additionally, potable water will be maintained for drinking purposes. These facilities will be maintained adjacent to the Work Zone, not within it.

All eating, drinking, smoking, and break facilities, as well as the equipment storage and vehicle parking will be located in the Support Zones.

7.4 ILLUMINATION

Work conducted in low light will be illuminated to a minimum of 10 foot-candles. Work for this project is not planned prior to sunrise or after sunset.

7.5 IGNITION SOURCES

Ignition sources (e.g., cigarette lighters, matches, or other flame producing items) not required for the completion of this project will not be permitted in the Exclusion Zones. Before any work is done that might release vapors, Work Zones will be barricaded and posted. Burning or other work that might be a source of ignition will be stopped. All sources of ignition will be eliminated from the area where flammable vapors may be present or may travel. Signs will be posted warning that vehicles and other sources of ignition will be kept out of the area. No work will be done if the direction of the wind might carry vapors into areas outside the Work Zones where they might produce a hazardous condition, nor when an electrical storm is threatening the site of work. Sparks caused by friction or electrostatic effects may also be a source of ignition in flammable atmospheres, especially at low

humidity. Proper grounding of metal objects and/or electrical equipment, together with the use of sparkless tools and localized adjustment of humidity, may reduce this hazard. If necessary, an ACS Hot Work permit will be completed and complied with during the hot work.

7.6 SITE APPEARANCE

KES will maintain all areas covered by the project, and those areas affected by project work, free from accumulations of waste, debris, rubbish, and extraneous materials caused by or resulting from construction operation. Roadways accessing the project site will be kept free from build-up of dust, soil, mud, mineral products, waste, or debris, which might result from construction operation.

8.0 HAZARD CONTROLS

8.1 AIR MONITORING

This project does not include intrusive activities; therefore, air monitoring will not be conducted. If intrusive activities are encountered, an addendum to this Plan will be prepared to delineate the necessary air monitoring requirements.

8.2 PERSONAL PROTECTIVE EQUIPMENT

KES will provide all KES on-site personnel with appropriate personal safety equipment and protective clothing, and will ensure that all safety equipment and protective clothing is kept clean and well maintained. Level D will be worn during all activities associated with this project. If intrusive activities are conducted, Level C PPE will be worn by trained personnel.

TABLE 8.2
PPE REQUIREMENTS

Task	Level of PPE
Mobilization	**Routine Activities: Level D** No impacted material disturbance or handling: • Work clothing, as dictated by the weather • Safety (steel toe/shank) shoes or boots • Hard-hats • Safety Glasses with side shields • Hearing Protection (as required)
Clearing/Grubbing	**Routine Activities: Level D** No impacted material disturbance or handling: • Work clothing, as dictated by the weather • Safety (steel toe/shank) shoes or boots • Hard-hats • Safety Glasses with side shields • Hearing Protection (as required) **Intrusive Activities: Level C** • CPF-3 coveralls with booties and hood • Nitrile inner and outer gloves • Air purifying respirator with P100/A/OV cartridges
Grading Installation of Clay Layer Installation of Erosion Control	**Routine Activities: Level D** No impacted material disturbance or handling: • Work clothing, as dictated by the weather • Safety (steel toe/shank) shoes or boots • Hard-hats • Safety Glasses with side shields • Hearing Protection (as required)

All personal protective equipment and clothing (including work clothing and safety shoes/boots) worn in contaminated areas of this site will be decontaminated or properly disposed of at the end of the workday. The Site Supervisor will be responsible for ensuring all personal protective clothing/equipment is decontaminated after use.

8.3 CONFINED SPACE ENTRY

Confined space entry should not be necessary for this project. Absolutely no personnel will be permitted to enter any confined space as a part of this project unless they follow the Koester Confined Space Entry Program.

8.4 RESPIRATORY PROTECTION PROGRAM

All KES personnel have been trained in proper respirator care and use and are required to submit to an annual fit-test of their personal respirator. Additionally, all personnel have been medically evaluated and approved to use respirators. The following general procedures will be followed when using respirators in addition to the procedures outlined in Chapter 8 of the Koester Health and Safety Program Manual.

- Respirators will not be worn when conditions prevent a good face seal.
- Beards will not be permitted.
- Make sure the respirator is clean before each use.
- Utilize sealed replacement cartridges.
- Immediately change out cartridges if odor is detected inside the respirator.
- Each employee will inspect his or her respirator before each use for face shield/seal damage, tears, discoloration, holes, etc.

All on-site personnel unable to pass a respiratory fit-test will not be assigned tasks that require the use of respiratory protection. Documentation of fit-test will be available on-site at all times.

Each respirator is individually assigned and not interchanged between workers. Cartridges and filters will be changed daily or upon breakthrough, whichever occurs first.

All employees requiring prescription eyewear have been provided optical inserts for respirator use. Regular eyeglasses will not be permitted to be worn with respirators as they prevent a tight facepiece-to- face seal.

9.0 DECONTAMINATION

Soap and water will be used for cleaning. Following washing, hands will be rinsed with clean water. When temperatures fall to or below 32 degrees F, an additive will be mixed into the decontaminating solutions to prevent the solutions from freezing. Personnel who inadvertently become contaminated will immediately wash all contaminated areas.

Equipment will be cleaned of dirt prior to leaving the site, utilizing dry cleaning methods. Activities associated with this project are not anticipated to contact contaminated material. In the event that contaminated material is encountered and decontamination is necessary, an addendum to this Plan will be prepared.

10.0 EMERGENCY RESPONSE REQUIREMENTS

10.1 EMERGENCY PHONE NUMBERS AND WARNING SYSTEMS

EMERGENCY - 911

If you require an ambulance, police, or fire department, **dial 911.** Emergency telephone numbers for other involved parties can be found at the front of this HASP.

Several warning systems may be utilized depending on the work site conditions, the type and degree of emergency involved. Among those available and appropriate for this site are:

- Verbal communications - Verbal Instructions with or without assistance are used to deal with specific incidents.
- Vehicle horn/ Portable hand held compressed air horns - Horn signals are used to signify and emergency warning. One long blast of a vehicular or compressed air horn is used on-site to signify emergency evacuation of the immediate work area to the predetermined rally point. A head count will be taken and further instructions given. Repeated short blasts are used on-site or from off-site to signify evacuation of all personnel from the exclusion zone to the hot line where further instructions will be given after a head count.
- Telephones
- Two-way radios.

10.2 SPILLS OR RELEASES TO THE ENVIRONMENT

In the event of an accidental spill or release to the environment KES personnel will follow the instructions detailed in the Spill Control Plan developed for this project.

10.3 EMERGENCY EVENTS

In the event of emergency associated with remedial action, remove or otherwise minimize the cause of the emergency, then alert Montgomery Watson and institute whatever measures which might be necessary to prevent any repetition of the conditions or actions leading to, or resulting in, the emergency.

All site-support vehicles will be equipped with route maps providing directions to the medical treatment facility. Additionally, a copy of the route map is included within this HASP. All personnel will become familiar with the emergency route and the travel time required at the beginning of project operations.

10.4 EMERGENCY PLAN FOR ADVERSE WEATHER CONDITIONS

All personnel shall read and know the location of this Health and Safety Plan and the plan maps located in each vehicle. In the event of adverse weather or in case of fire or natural disaster, the Site Supervisor and SSHO will inform all personnel to cease work activities. Secure the work site if the situation permits. The Site Supervisor or SSHO shall:

- Instruct the workers in safely shutting down the job and securing the work site (if the situation allows).
- Account for all employees and site personnel.
- Designate an escape routes and meeting place.
- Obtain any necessary rescue and medical services.
- Maintain the necessary resources to minimize the consequences of accidents or natural disaster.

- Communicate between on-site personnel and off-site emergency support.
- Maintain emergency phone numbers for ambulance, police, fire and hospital. Include route to nearest hospital. All KES vehicles shall maintain an emergency book with phone numbers and maps to the nearest medical facility.

Adverse weather shall include, but not be limited to:

- Thunderstorms
- Electrical storms
- Hail
- Tornadoes

Site specific considerations include:

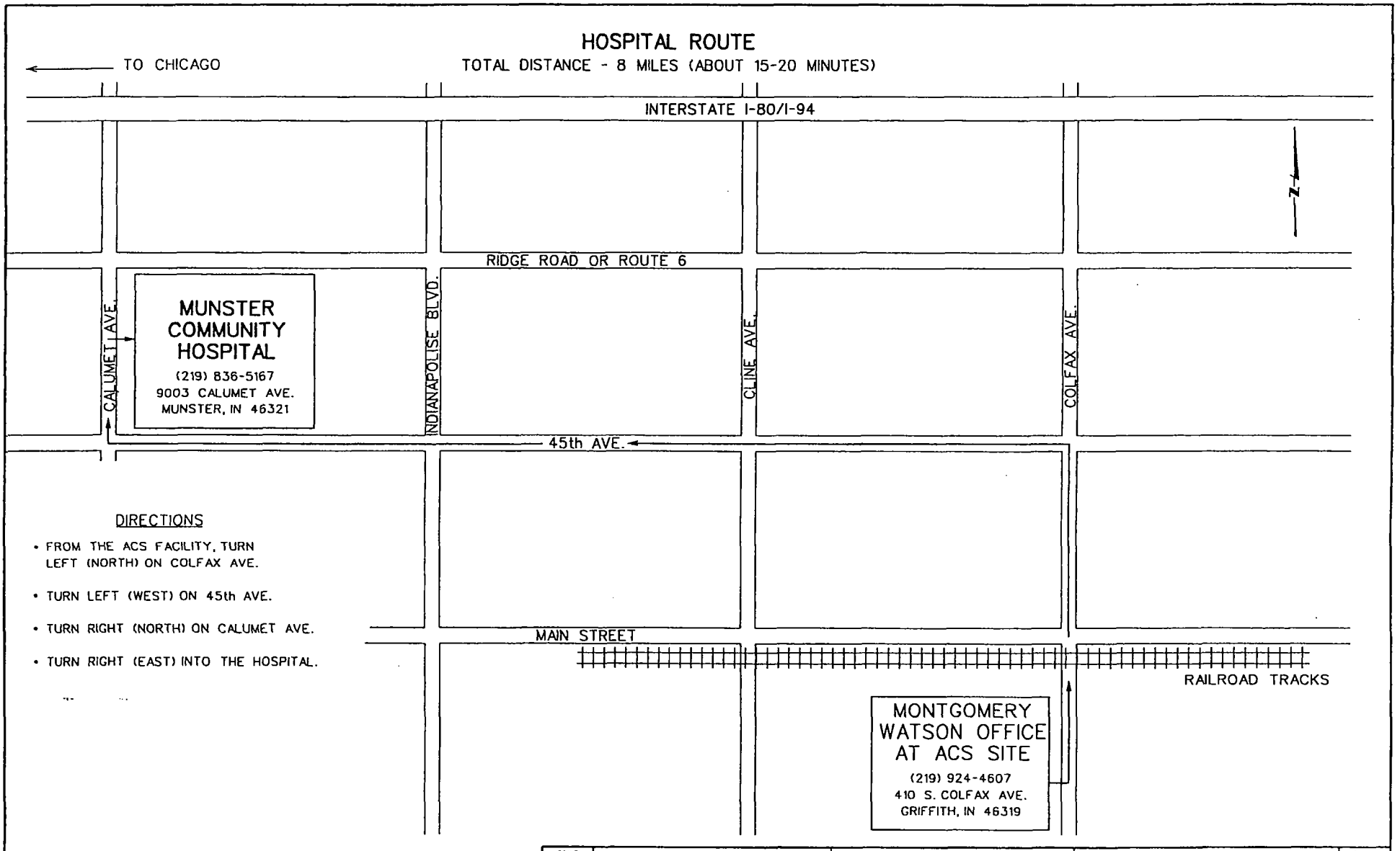
- Winds are primarily out of the southwest.
- Occasionally, storms develop resulting in wind directional changes.
- Severe thunderstorms produce dangerous lightning, high winds and often, hail.
- Work will be halted when lightning or dangerous thunderstorms are imminent.

APPENDIX A

MAPS

HOSPITAL ROUTE

TOTAL DISTANCE - 8 MILES (ABOUT 15-20 MINUTES)



DIRECTIONS

- FROM THE ACS FACILITY, TURN LEFT (NORTH) ON COLFAX AVE.
- TURN LEFT (WEST) ON 45th AVE.
- TURN RIGHT (NORTH) ON CALUMET AVE.
- TURN RIGHT (EAST) INTO THE HOSPITAL.

SCALE				FIGURE
NOT TO SCALE	MONTGOMERY WATSON Chicago, Illinois	ACS RD/RA GROUP AMERICAN CHEMICAL SERVICE SUPERFUND SITE GRIFFITH, INDIANA	SITE LOCATION MAP AND HOSPITAL ROUTE	8-1

APPENDIX B

ACTIVITY HAZARD ANALYSES

Koester Environmental Services, Inc.
Activity Hazard Analysis

Activity: Mobilization/Site Prep Prepared By: Erin Blankenberger Reviewed By/Date: _____
Location: American Chemical Service Prepared Date: July 2001

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Identify the principal steps involved, including the equipment and machinery to be used, and the sequence of work activities.	Analyze each principal step for its potential chemical/toxicological, radiological, biological and physical hazards	Develop specific controls for each potential hazard. Also: • List inspection requirements for the equipment /machinery listed. • Specify worker training requirements.
1. Use of heavy equipment. 2. Mark utilities.	Chemical/Toxicological Hazards: None Radiological Hazards: None. Biological Hazards: 1. Poisonous plants in the area like poison ivy, oak and sumac. 2. Insects such as mosquitoes and ticks. 3. Slight possibility of wild animals. Physical Hazards: 1. Slip/trip/fall on uneven terrain. 2. Heat stress. 3. Noise from heavy equipment. 4. Being struck by or against a large piece of equipment. 5. Rollover 6. Operation near overhead utilities. 7. Operation near roadways. 8. Disruption of utilities.	Chemical/Toxicological Hazards: 1. Level D PPE. Radiological Hazards: None required. Biological Hazards: 1. Use Level D PPE to protect against skin contact with poisonous plants. 2. Watch your step, avoid areas with high density of mosquitoes or stagnant water. After and during field activities, check for ticks in hair and on exposed skin. Deer ticks, which can cause Lyme disease, are very small. 3. Avoid wild animals. Physical Hazards: 1. Watch where you step, be aware of the terrain. 2. Wear appropriate clothing. Take breaks as required in the H&S plan. 3. Wear hearing protection where necessary. 4. Be aware of where the equipment is operating. Never move around the equipment unless you have direct eye contact with the equipment operator. 5. Make sure equipment has rollover protection. Wear seat belt. 6. Have spotter to make sure equipment does not come closer than 10 feet from electrical lines. Have electric company put protective blankets over electric lines. 7. Use signs, barricades, flaggers, as necessary. Prepare a traffic control plan. 8. Montgomery Watson to provide utility locates.

Koester Environmental Services, Inc.
Activity Hazard Analysis Form

Activity: Excavation (Grading) Prepared By: Erin Blankenberger Reviewed By/Date: _____
Location: American Chemical Service Prepared Date: July 2001

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Identify the principal steps involved, including the equipment and machinery to be used, and the sequence of work activities.	Analyze each principal step for its potential chemical/toxicological, radiological, biological and physical hazards	Develop specific controls for each potential hazard. Also: • List inspection requirements for the equipment /machinery listed. • Specify worker training requirements.
1. Use of heavy equipemnt to grade soils and to place fill.	Chemical/Toxicological Hazards: None Radiological Hazards: None. Biological Hazards: 1. Poisonous plants in the area like poison ivy, oak and sumac. 2. Insects such as mosquitoes and ticks. 3. Slight possibility of wild animals. Physical Hazards: 1. Slip/trip/fall on uneven terrain. 2. Heat stress. 3. Noise from heavy equipment. 4. Being struck by or against a large piece of equipment. 5. Rollover 6. Operation near overhead utilities. 7. Operation near roadways.	Chemical/Toxicological Hazards: 1. Level D PPE. Radiological Hazards: None required. Biological Hazards: 1. Use Level D PPE to protect against skin contact with poisonous plants. 2. Watch your step, avoid areas with high density of mosquitoes or stagnant water. After and during field activities, check for ticks in hair and on exposed skin. Deer ticks, which can cause Lyme disease, are very small. 3. Avoid wild animals. Physical Hazards: 1. Watch where you step, be aware of the terrain. 2. Wear appropriate clothing. Take breaks as required in the H&S plan. 3. Wear hearing protection where necessary. 4. Be aware of where the equipment is operating. Never move around the equipment unless you have direct eye contact with the equipment operator. 5. Make sure equipment has rollover protection. Wear seat belt. 6. Have spotter to make sure equipment does not come closer than 10 feet from electrical lines. Have electric company put protective blankets over electric lines. 7. Use signs, barricades, flaggers, as necessary

Roester Environmental Services, Inc.
Activity Hazard Analysis

Activity: Clearing and Grubbing Prepared By: Erin Blankenberger Reviewed By/Date: _____
Location: American Chemical Service Prepared Date: July 2001

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Identify the principal steps involved, including the equipment and machinery to be used, and the sequence of work activities.	Analyze each principal step for its potential chemical/toxicological, radiological, biological and physical hazards	Develop specific controls for each potential hazard. Also: • List inspection requirements for the equipment /machinery listed. • Specify worker training requirements.
1. Clearing site	Chemical/Toxicological Hazards: None Radiological Hazards: None. Biological Hazards: 1. Poisonous plants in the area like poison ivy, oak and sumac. 2. Insects such as mosquitoes and ticks. 3. slight possibility of wild animals. Physical Hazards: 1. Slip/trip/fall on uneven terrain 2. Heat stress 3. Pinch points and cuts to the hand and body. 4. Heavy manual lifting. 5. Being struck by or against a large piece of equipment. 6. Eye injury from flying debris while grubbing.	Chemical/Toxicological Hazards: 1. Level D personal protective equipment. Radiological Hazards: None required. Biological Hazards: 1. Use Level D PPE to protect against skin contact with poisonous plants. 2. Watch your step; avoid areas with high density of mosquitoes or stagnant water. 3. After and during field activities, check for ticks in hair and on exposed skin. Deer ticks, which can cause Lyme disease, are very small. 4. Avoid wild animals. Physical Hazards: 1. Be aware of sticks, rocks or other items which can be concealed by leaves and grass, causing a trip hazard. 2. Wear appropriate clothing. 3. Wear heavy work gloves while clearing and grubbing. 4. Use proper lifting techniques when lifting or pulling. 5. Use eye protection.

Roester Environmental Services, Inc.
Activity Hazard Analysis

Activity: Transportation Prepared By: Erin Blankenberger Reviewed By/Date: _____
Location: American Chemical Services Prepared Date: July 2001

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Identify the principal steps involved, including the equipment and machinery to be used, and the sequence of work activities.	Analyze each principal step for its potential chemical/toxicological, radiological, biological and physical hazards	Develop specific controls for each potential hazard. Also: • List inspection requirements for the equipment /machinery listed. • Specify worker training requirements.
1. Use of dump trucks.	Chemical/Toxicological Hazards: None Radiological Hazards: None. Biological Hazards: 1. Insects such as mosquitoes and ticks. Physical Hazards: 1. Slip/trip/fall on uneven terrain. 2. Heat stress. 3. Noise from heavy equipment. 4. Being struck by or against a large piece of equipment.	Chemical/Toxicological Hazards: 1. Level D PPE. Radiological Hazards: None required. Biological Hazards: 1. Watch your step, avoid areas with high density of mosquitoes or stagnant water. Physical Hazards: 1. Watch where you step, be aware of the terrain. 2. Wear appropriate clothing. Drink plenty of fluids. Take breaks as required in the H&S plan. 3. Wear hearing protection where necessary. 4. Be aware of where the equipment is operating. Never move around the equipment unless you have direct eye contact with the equipment operator.

[redacted]este[redacted]viro[redacted]ntal[redacted]ices[redacted].

Activity Hazard Analysis

Activity: Erosion Control | Prepared By: Erin Blankenberger | Reviewed By/Date: _____

Location: American Chemical Service | Prepared Date: July 2001

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Identify the principal steps involved, including the equipment and machinery to be used, and the sequence of work activities.	Analyze each principal step for its potential chemical/toxicological, radiological, biological and physical hazards	Develop specific controls for each potential hazard. Also: • List inspection requirements for the equipment /machinery listed. • Specify worker training requirements.
1. Moving erosion control materials. 2. Placing erosion control materials.	Chemical/Toxicological Hazards: None Radiological Hazards: None. There are no known radioactive materials at this site. Biological Hazards: 1. Insects such as mosquitoes and ticks. Physical Hazards: 1. Slip/trip/fall on uneven terrain. 2. Heat stress. 3. Back strain.	Chemical/Toxicological Hazards: 1. Level D PPE. Radiological Hazards: None required. Biological Hazards: 1. Watch your step, avoid areas with high density of mosquitoes or stagnant water. Physical Hazards: 1. Watch where you step, be aware of the terrain. 2. Wear appropriate clothing. Drink plenty of fluids. Take breaks as required in the H&S plan. 3. Use proper lifting techniques.

APPENDIX C

POTENTIAL CHEMICAL CONTAMINANTS

APPENDIX C

POTENTIAL CHEMICAL CONTAMINANTS

EXPOSURE INFORMATION						
Chemical	**Routes of Exposure**	**Signs/Symptoms**	**First Aid**	**Exposure Limits**	**IDLH, ppm**	**Ionization Potential**
Benzene	Inhalation Absorption Ingestion	Carcinogen; Irritation of eyes, skin, nose, respiratory system; giddiness; headache, nausea, staggered gait; fatigue, anorexia, weakness, exhaustion; dermatitis; bone marrow depressant. Target Organs: Eyes, skin, respiratory system, blood, CNS, bone marrow.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Do not induce vomiting. Seek medical attention.	1 ppm (PEL) 0.5 ppm (TLV)	500	9.24 eV
Acetone	Inhalation Ingestion Absorption	Irritation of eyes, nose, throat; headache, dizziness, CNS depressant Target Organs: Eyes, skin, respiratory system, CNS	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Seek medical attention.	1000 ppm (PEL) 750 ppm (TLV)	2500	9.69 eV
Bis(2-Chloroethyl) ether (Dichloroethyl ether)	Inhalation Ingestion Absorption	Irritation to nose, throat, respiratory system; tearing of eyes; cough; nausea, vomiting. Target Organs: Eyes, respiratory system, liver	**Eyes:** Rinse with plenty of water for several minutes. **Skin:** Rinse and then wash skin with water and soap. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Seek medical attention.	15 ppm (PEL)	100	NA
2-Butanone (MEK, Methyl Ethyl Ketone)	Inhalation Ingestion Absorption	Irritation of eyes, skin, nose; headache; dizziness; vomiting; dermatitis. Target Organs: Eyes, skin, respiratory system, CNS	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Seek medical attention.	200 ppm(PEL) 200 ppm (TLV)	3000	9.54 eV
Chloroethane (Ethyl chloride)	Inhalation Ingestion Absorption	Incoordination, inebriation; abdominal cramps; cardiac arrythmias, cardiac arrest; liver, kidney damage. Target Organs: Liver, kidneys, respiratory system, cardiovascular system, CNS	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Rinse with water. Seek medical attention. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Seek medical attention.	1000 ppm (PEL) 1000 ppm (TLV)	3800	10.97 eV

EXPOSURE INFORMATION

Chemical	Routes of Exposure	Signs/Symptoms	First Aid	Exposure Limits	IDLH, ppm	Ionization Potential
1,2-Dichlorobenzene	Inhalation Ingestion Absorption	Irritation of eyes, nose; liver, kidney damage; skin blisters. Target Organs: Eyes, skin, respiratory system, liver, kidneys	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Seek medical attention.	50 ppm C (PEL) 25 ppm (TLV)	200	9.06
1,1-Dichloroethane	Inhalation Ingestion Contact	Irritation to skin; CNS depressant; liver, kidney, lung damage. Target Organs: Skin, liver, kidneys, lungs, CNS.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Seek medical attention.	100 ppm (PEL) 100 ppm (TLV)	3000	11.06 eV
1,2-Dichloroethane (Ethylene dichloride)	Inhalation Ingestion Absorption	Irritation to eyes, corneal opacity; CNS depressant; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage. Target Organs: Eyes, skin, kidneys, liver, CNS, Cardiovascular system	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Give nothing to drink. Seek medical attention.	50 ppm C (PEL) 10 ppm (TLV)	50	11.05 eV
1,1-Dichloroethene (Vinylidene chloride)	Inhalation Ingestion Absorption	Irritation to eyes, kin, throat; dizziness, headache, nausea, difficulty breathing; liver, kidney dysfunction; pneumonitis. Target Organs: Eyes, skin, respiratory system, CNS, liver, kidneys	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Do NOT induce vomiting. Seek medical attention.	5 ppm (TLV)	ND	10.00 eV

EXPOSURE INFORMATION

Chemical	Routes of Exposure	Signs/Symptoms	First Aid	Exposure Limits	IDLH, ppm	Ionization Potential
1,2-Dichloropropane	Inhalation Ingestion Absorption	Irritation to eyes, skin, respiratory system; drowsiness, lightheadedness; liver, kidney damage. Target Organs: Eyes, skin, respiratory system, liver, kidneys, CNS	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Seek medical attention.	75 ppm (PEL) 75 ppm (TLV)	400	10.87 eV
Diethyl phthalate	Inhalation Ingestion	Irritation to eyes, skin, nose, throat; headache, dizziness, nausea; tearing of eyes; possible polyneuropathy, vestibular dysfunction; pain, numbness, weakness, spasms in arms and legs. Target Organs: Eyes, skin, respiratory system, CNS, peripheral nervous system, reproductive system.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Seek medical attention.	10 ppm (TLV)	ND	NA
Dimethyl phthalate	Inhalation Ingestion	Irritation to eyes, upper respiratory system; stomach pain. Target Organs: Eyes, respiratory system, gastrointestinal tract.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water and soap. **Inhalation:** Get to fresh air. **Ingestion:** Rinse mouth. Do NOT induce vomiting. Seek medical attention.	5 mg/m3 (PEL) 5 mg/m3 (TLV)	2000 mg/m3	9.64 eV
Di-n-butyl phthalate	Inhalation Ingestion	Irritation of eyes, upper respiratory tract, stomach. Target Organs: Eyes, respiratory system, gastrointestinal tract.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Seek medical attention.	5 mg/m3 (PEL) 5 mg/m3 (TLV)	4000 mg/m3	NA
Ethylbenzene	Inhalation Ingestion	Irritation to eyes, skin, mucous membranes; headache; dermatitis; narcosis, coma. Target Organs: Eyes, skin, respiratory system, CNS	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water and soap. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Give a slurry of activated charcoal in water to drink. Seek medical attention.	100 ppm (PEL) 100 ppm (TLV)	800	8.76 eV

EXPOSURE INFORMATION

Chemical	Routes of Exposure	Signs/Symptoms	First Aid	Exposure Limits	IDLH, ppm	Ionization Potential
Isophorone	Inhalation Ingestion	Irritation of eyes, nose, throat; headache, nausea, dizziness, fatigue, narcosis; dermatitis. Target Organs: Eyes, skin, respiratory system, CNS, liver, kidneys.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water/soap. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Seek medical attention.	25 ppm (PEL) 5 ppm (TLV)	200	9.07 eV
Methylene chloride	Inhalation Ingestion Absorption	Carcinogen. Irritation of eyes, skin; fatigue, weakness, sleepiness, unnatural drowsiness, lightheadedness; numbness, tingle of limbs; nausea. Target Organs: Eyes, skin, cardiovascular system, CNS.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water/soap. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Do NOT induce vomiting. Seek medical attention.	25 ppm (PEL) 50 ppm (TLV)	2300	11.32 eV
4-Methyl-2-pentanone (Methyl isobutyl ketone, MIBK)	Inhalation Ingestion	Irritation of eyes, skin, mucous membrane; headache, narcosis, coma; dermatitis. Target Organs: Eyes, skin, respiratory system, CNS, liver, kidneys.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water and soap. **Inhalation:** Get to fresh air. **Ingestion:** Rinse mouth. Do NOT induce vomiting. Seek medical attention.	100 ppm (PEL) 50 ppm (TLV)	500	9.30 eV
4-Methylphenol (p-Cresol)	Inhalation Ingestion Absorption	Irritation of eyes, skin, mucous membrane; CNS effects: confusion, depressant/depression, respiratory failure; difficulty breathing, irregular/irregularities rapid respiratory, weakened pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage. Target Organs: Eyes, skin, respiratory system, CNS, liver, kidneys, pancreas, cardiovascular system.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water/soap. **Inhalation:** Get to fresh air. Artificial respiration if indicated. Seek medical attention. **Ingestion:** Rinse mouth. Do NOT induce vomiting. Seek medical attention.	5 ppm (PEL) 5 ppm (TLV)	250	8.97 eV

EXPOSURE INFORMATION

Chemical	Routes of Exposure	Signs/Symptoms	First Aid	Exposure Limits	IDLH, ppm	Ionization Potential
Naphthalene	Inhalation Ingestion Absorption	Irritation of eyes; headache, confusion, excitement, vague feeling of discomfort; nausea, vomiting, abdominal pain; irritation of bladder; profuse sweating; jaundice; hematuria (blood in the urine), hemoglobinuria, renal shutdown; dermatitis, optical neuritis, corneal damage. **Target Organs:** Eyes, skin, blood, liver, kidneys, central nervous system	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water/soap. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Seek medical attention.	10 ppm (PEL)	250	8.12 eV
Phenol	Inhalation Ingestion Absorption	Irritation of eyes, nose, throat; anorexia, weight loss; weakness, muscle ache, pain; dark urine; cyanosis; liver, kidney damage; skin burns; dermatitis; ochronosis; tremor, convulsions, twitching. Target Organs: Eyes, skin, respiratory system, liver, kidneys	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Seek medical attention.	5 ppm (PEL) 5 ppm (TLV)	250	8.50 eV
Tetrachloroethene (Tetrachloroethylene)	Inhalation Ingestion Absorption	Irritation of eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; vertigo, dizziness, incoordination; headache, sleepiness, unnatural drowsiness; skin redness; liver damage; [Potential occupational carcinogen]. **Target Organs:** Eyes, skin, respiratory system, liver, kidneys, CNS	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Do NOT induce vomiting. Seek medical attention.	100 ppm (PEL) 50 ppm (TLV)	150	9.32 eV
Tetrahydrofuran	Inhalation Ingestion	Irritation of eyes, upper respiratory system; nausea, dizziness, headache, central nervous system depressant/depression. **Target Organs** Eyes, respiratory system, central nervous system.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. **Ingestion:** Rinse mouth. Seek medical attention.	200 ppm (PEL) 200 ppm (TLV)	2000	9.45 eV
Toluene	Inhalation Ingestion Absorption	Irritation of eyes, nose; fatigue, weakness, confusion, euphoria, dizziness, headache; nervousness, muscle fatigue, insomnia; dermatitis; liver, kidney damage. Target Organs: Eyes, skin, respiratory system, CNS, liver, kidney	**Eyes:** Rinse with plenty of water for several minutes. Seek immediate medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water and soap. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Do not induce vomiting. Give a slurry of activated charcoal in water to drink. Seek medical attention.	200 ppm (PEL) 50 ppm (TLV)	500	8.82 eV

EXPOSURE INFORMATION

Chemical	Routes of Exposure	Signs/Symptoms	First Aid	Exposure Limits	IDLH, ppm	Ionization Potential
1,1,1-Trichloroethane (Methyl chloroform)	Inhalation Ingestion	Irritation of eyes, skin; headache, weakness, exhaustion, central nervous system depressant/depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage. **Target Organs** Eyes, skin, central nervous system, cardiovascular system, liver	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water/soap. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Seek medical attention.	350 ppm (PEL) 350 ppm (TLV)	700	11.0 eV
Trichloroethene	Inhalation Ingestion Absorption	Carcinogen; Irritation of eyes, skin; headache, vertigo; visual disturbance, fatigue, giddiness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias; liver injury. Target Organs: Eyes, skin, respiratory system, heart, liver, kidneys, CNS	**Eyes:** Rinse with plenty of water for several minutes. Seek immediate medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water and soap. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Do not induce vomiting. Give plenty of water to drink. Seek medical attention.	100 ppm (PEL) 50 ppm (TLV)	1000	9.45 eV
Trichlorofluoromethane	Inhalation Ingestion	Incoordination, tremor; dermatitis; cardiac arrhythmias, cardiac arrest; asphyxia. **Target Organs** Skin, respiratory system, cardiovascular system.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Seek medical attention.	1000 ppm (PEL) 1000 ppm (TLV)	2000	11.77 eV
Vinyl chloride	Inhalation	Carcinogen. Weakness; abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities. Target Organs: Liver, CNS, blood, respiratory system, lymphatic system.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. **Ingestion:** Rinse mouth. Seek medical attention.	1 ppm C (PEL) 5 ppm (TLV)	ND	9.99 eV
Xylene	Inhalation Ingestion Absorption	irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis. **Target Organs** Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Give slurry of activated carbon in water to drink. Do NOT induce vomiting. Seek medical attention.	100 ppm (PEL) 100 ppm (PEL)	900	8.44 eV

EXPOSURE INFORMATION

Chemical	Routes of Exposure	Signs/Symptoms	First Aid	Exposure Limits	IDLH	Ionization Potential
Antimony	Inhalation Ingestion Absorption	Irritation of eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly. **Target Organs** Eyes, skin, respiratory system, cardiovascular system.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. **Ingestion:** Rinse mouth.	0.5 mg/m3 (PEL) 0.5 mg/m3 (TLV)	50 mg/m3	NA
Arsenic	Inhalation Ingestion Absorption	Carcinogen; Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, respiratory irritation. **Target Organs:** Liver, kidneys, skin, lungs, lymphatic system.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Induce vomiting. Seek medical attention.	0.01 mg/m3 (PEL) 0.01 mg/m3 (PEL)	5 mg/m3	NA
Chromium	Inhalation Ingestion	Irritation of eyes, skin; lung fibrosis. **Target Organs**: Eyes, skin, respiratory system.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. **Ingestion:** Rinse mouth.	1 mg/m3 (PEL) 0.5 mg/m3 (TLV)	250 mg/m3	NA
Lead	Inhalation Ingestion	Weakness, insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist; kidney disease. **Target Organs**: Eyes, gastrointestinal tract, CNS, kidneys, blood, gingival tissue.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Rinse mouth. Induce vomiting. Seek medical attention.	0.05 mg/m3 (PEL) 0.05 mg/m3 (TLV)	100 mg/m3	NA
Mercury	Inhalation Ingestion Absorption	Irritation of eyes, skin; cough, chest pain, breathing difficulty, bronchitis pneumonitis; tremor, insomnia, irritability, indecision, headache, fatigue, weakness; stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria. **Target Organs:** Eyes, skin, respiratory system, central nervous system, kidneys.	**Eyes:** Rinse with plenty of water for several minutes. Seek medical attention. **Skin:** Remove contaminated clothing. Rinse and then wash skin with water. **Inhalation:** Get to fresh air. Seek medical attention. **Ingestion:** Seek medical attention.	0.1 mg/m3 C (PEL) 0.025 mg/m3 (TLV)	10 mg/m3	NA